

## CLAIMS

1. A communication apparatus for communicating with another communication apparatus via a transmission line in which  
5 characteristics of the transmission line periodically change, the communication apparatus comprising:

a transmission line estimation portion for dividing a period  
by which the characteristics of the transmission line are changed  
into n number of sections (n is an integer equal to or greater  
10 than 2) and estimating the characteristics of the transmission line regarding each of the n number of sections; and

a communication parameter determination portion for  
acquiring n number of communication parameters optimum for the  
respective n number of sections in accordance with an estimation  
15 result obtained by the transmission line estimation portion, and  
determining one communication parameter which is optimum for all  
the n number of sections based on the n number of communication  
parameters.

2. A communication apparatus according to claim 1, wherein  
20 the communication parameter determination portion obtains a total  
sum of each of the n number of communication parameters, the total  
sum being obtained by multiplication using an applicability  
coefficient, which is defined in accordance with communication  
quality when the respective communication parameter is applied  
25 to the other sections, and adding the multiplication results; and

determines the communication parameter having the maximum total sum as the one communication parameter optimum for all the n number of sections.

3. A communication apparatus according to claim 2, wherein  
5 the applicability coefficient is the number of sections having a message error ratio equal to or less than a predetermined value when each of the n number of communication parameters is applied to the other sections.

4. A communication apparatus according to claim 2, wherein  
10 the applicability coefficient is a rank of a PHY rate which is obtained from the n number of communication parameters.

5. A communication apparatus according to claim 2, wherein  
the applicability coefficient is estimated in accordance with a result of dividing each of the n number of communication parameters  
15 into a plurality of groups having different communication frequencies and comparing the groups having the same communication frequency in the n number of communication parameters.

6. A communication apparatus according to claim 1, wherein  
the communication parameter determination portion synthesizes the  
20 n number of communication parameters of the n number of sections in accordance with an applicability coefficient, which is defined in accordance with communication quality when each of the n number of communication parameters is applied to the other sections, and thus generates n number of new communication parameters; and  
25 determines one communication parameter which is optimum for all

the n number of sections based on the n number of new communication parameters.

7. A communication apparatus according to claim 6, wherein the communication parameter determination portion obtains a total value obtained by multiplying each of the new n number of communication parameters by the applicability coefficient, and determines the communication parameter having the maximum total value as the one communication parameter optimum for all the n number of sections.

8. A communication apparatus according to claim 7, wherein the communication parameter determination portion:

places the n number of communication parameters into ranks in accordance with the highest to the lowest PHY rate;

performs synthesis processing of synthesizing the communication parameter placed at an i'th rank ( $i = 1$  through  $n$ ) with the communication parameter placed at an  $(i - 1)$ th or higher rank and thus generates a new communication parameter placed at the i'th rank;

obtains a total value by multiplying each of the n number of new communication parameters by the number of sections in which the respective communication parameter is effective; and

determines the new communication parameter having the maximum total value as the one communication parameter optimum for all the n number of sections.

9. A communication apparatus according to claim 8, wherein:

the communication parameter includes at least information providing a plurality of usable sub carriers and a modulation factor of each of the plurality of sub carriers; and

the synthesis processing compares a modulation factor of the communication parameter placed at the  $i$ 'th rank and a modulation factor of the communication parameter placed at the  $(i - 1)$ th or higher rank regarding each of the plurality of sub carriers, and generates a new communication parameter placed at the  $i$ 'th rank in which the modulation factor of the communication parameter placed at the  $i$ 'th rank has been updated into the lowest modulation factor.

10. A communication line estimation method executed by a communication apparatus for communicating with another communication apparatus via a transmission line in which characteristics of the transmission line periodically change, the method comprising:

dividing a period by which the characteristics of the transmission line are changed into  $n$  number of sections ( $n$  is an integer equal to or greater than 2) and estimating the characteristics of the transmission line regarding each of the  $n$  number of sections; and

acquiring  $n$  number of communication parameters optimum for the respective  $n$  number of sections in accordance with an estimation result obtained by the estimating; and

determining one communication parameter which is optimum

for all the n number of sections based on the n number of communication parameters.

11. A program for causing a communication apparatus, for communicating with another communication apparatus via a transmission line in which characteristics of the transmission line periodically change, to execute communication line estimation, the program comprising:

dividing a period by which the characteristics of the transmission line are changed into n number of sections (n is an integer equal to or greater than 2) and estimating the characteristics of the transmission line regarding each of the n number of sections; and

acquiring n number of communication parameters optimum for the respective n number of sections in accordance with an estimation result obtained by the estimating; and

determining one communication parameter which is optimum for all the n number of sections based on the n number of communication parameters.

12. An integrated circuit usable for a communication apparatus for communicating with another communication apparatus via a transmission line in which characteristics of the transmission line periodically change, the integrated circuit including circuits integrated and acting as:

a transmission line estimation portion for dividing a period by which the characteristics of the transmission line are changed

into  $n$  number of sections ( $n$  is an integer equal to or greater than 2) and estimating the characteristics of the transmission line regarding each of the  $n$  number of sections; and

5        a communication parameter determination portion for  
acquiring  $n$  number of communication parameters optimum for the  
respective  $n$  number of sections in accordance with an estimation  
result obtained by the transmission line estimation portion, and  
determining one communication parameter which is optimum for all  
the  $n$  number of sections based on the  $n$  number of communication  
10    parameters.